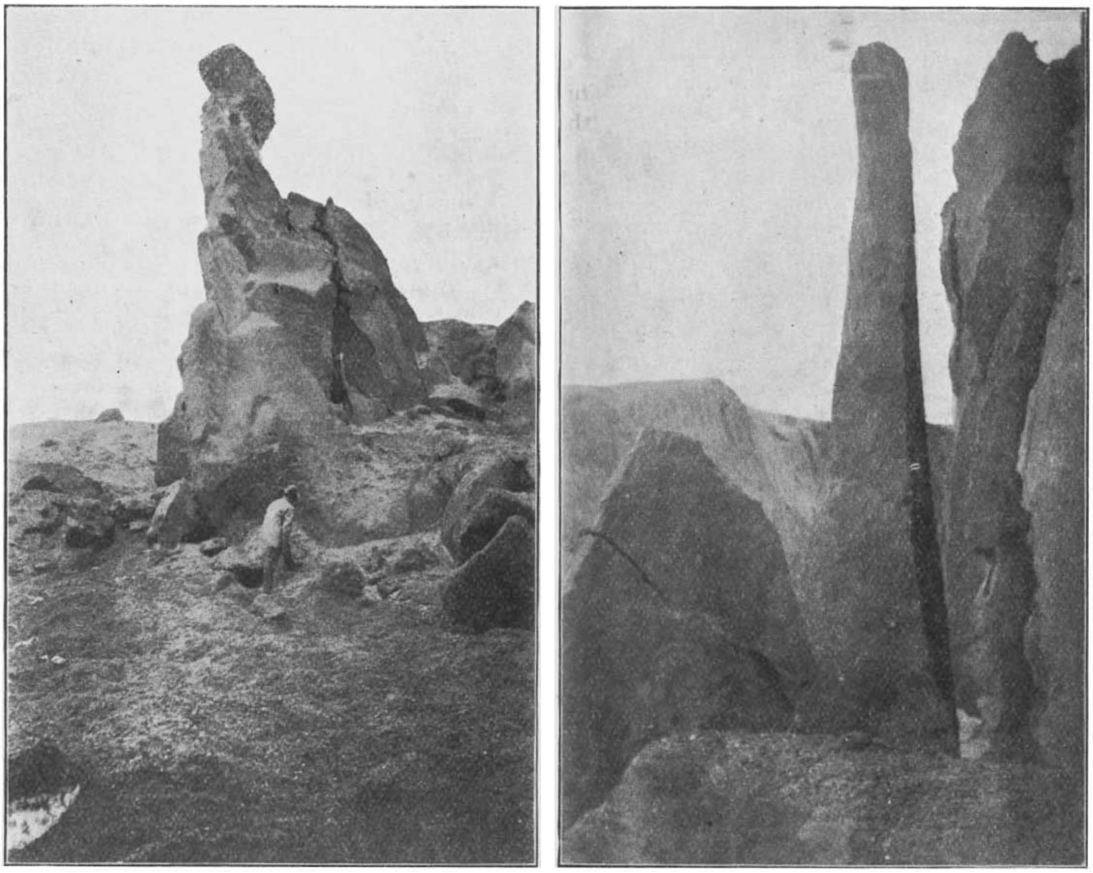
zooid. . . . In such wise the autotrophic zooid of highly differentiated anisokont habit may be visualised as passing on to the initiation of the series of the great marine group of the Phæophyceæ." Strange that an old Oxford teacher should have employed for his exposition a medium "complex beyond the possibilities of human computation."

Yet if the reader can summon up courage to face the repellent language of this tract he will find suggestions of extraordinary interest. The superiority of the botanist over the zoologist is emphasised; even "a tree is in many respects more entitled to respectful admiration than a man," unless, we presume, he be a botanist.



Photo] [J. W. Shipley. Photo] [J. W. Shipley.

FIG. 1.—Fractured sections of the Great Mud Flow. Note the conglomerate nature of the fragments and the irregular cleavage planes. Sometimes, however, the cleavage is quite regular, as shown in Fig. 2.

Human Personality and its Survival of Bodily Death. By Frederic W. H. Myers. Edited and abridged by S. B. and L. H. M. Pp. xiii + 307. (London: Longmans, Green, and Co., 1919.) Price 6*s*. 6*d*. net.

THE original two-volume work, published in 1903, is abridged by condensing the text and omitting the greater part of the appendices. The illustrative cases which are published form part of the text, and are nearly always quoted in full.

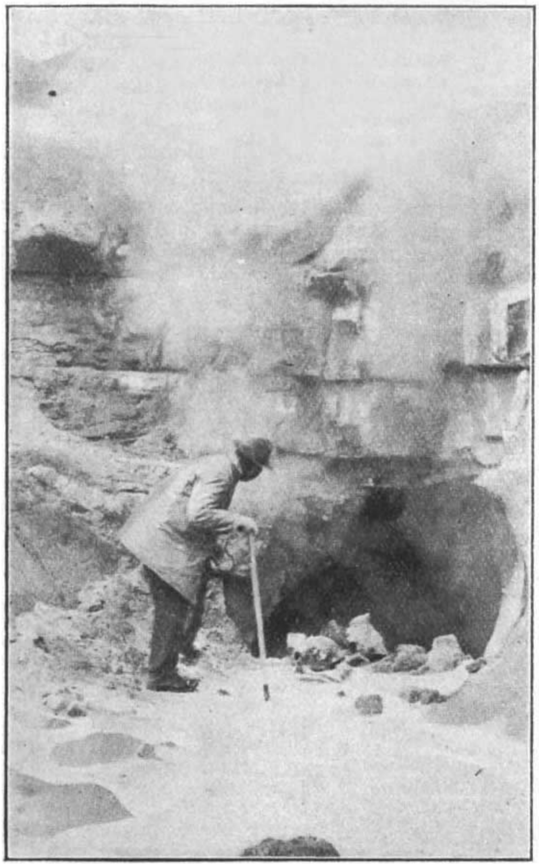
LETTERS TO THE EDITOR.

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of NATURE. *No notice is taken of anonymous communications.]*

The Nature of the Katmai Volcanic Gases and Encrustations.

THE fumarole activity following and continuing after the great Katmai eruption of June, 1912, has provided south-western Alaska with the first among the natural wonders of the world. The volcanic gases force their way to the surface over an area of more than fifty square miles. This area is covered with volcanic ash and pumice, largely distributed by an enormous flow of mud following the explosion of the Novarupta volcano, but preceding the outburst of Katmai ten miles to the eastward. The relatively coarse ash and pumice from Novarupta were not ejected to any considerable distance, but, falling locally, quickly melted the snow on the mountains, and, with the rainfall accompanying the eruption, slid down into the adjacent valleys, forming a viscous mass which poured down the Bering Sea slope of the peninsular axis for a distance of more than fifteen miles.

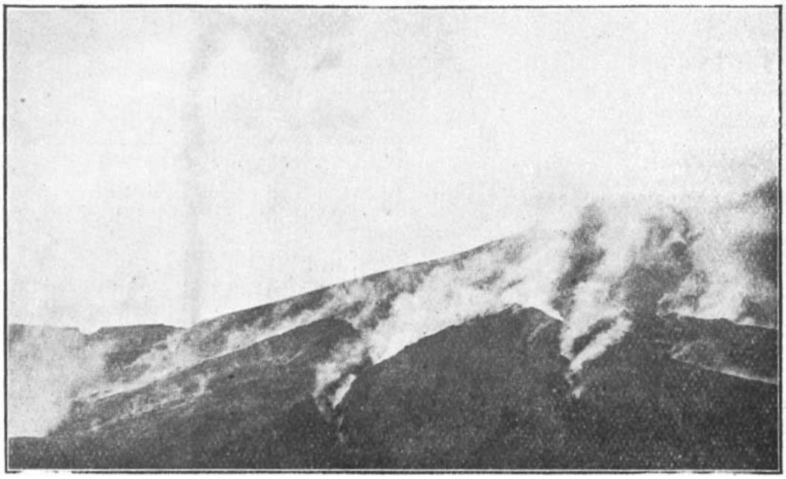
As the mud drained away, unlike the more fluid water, it left a very large residue adhering to the valley floor. Subjected to heat from below, the mud dried, caked, and was eventually baked. The contracting, hardening mass split and cracked according to the strains and stresses set up by the irregularities of the valley floor beneath. The Katmai volcanic ash lies conformably on top of this mud-flow. Apparently the order of the sixty-hour eruption of June, 1912, was:—(1) Novarupta explosion, followed by the great flow of mud; (2) Katmai eruption; and (3) the upthrusting of the lava plug of Novarupta. No ash covers this plug. It was the last major event to happen.



Photo] [*J. W. Shipley.*

FIG. 2.—Cross-section of horizontal tunnel about fifteen feet below the surface of the mud-flow. Note the cleavage planes of the mud above the vent. One hundred feet from this is another horizontal tunnel seventy-five feet below the surface, and large enough to drive a team and wagon through. These have most probably been formed by the solvent action of superheated steam and hydrofluoric acid.

The mud-flow occupies the floor of the Valley of Ten Thousand Smokes described in this journal by Dr. Griggs ("The Eruption of Katmai," NATURE, August 22, 1918, vol. ci., p. 497). The volcanic gases force their way upward through this superincumbent detrital material, using the existing cracks and fissures, and dissolving out new channels where openings were not already available. As chemist of the 1917 Katmai Expedition, it fell to my lot to examine these gases and the encrustations deposited around the fumaroles.



Photo] [*J. W. Shipley.*

FIG. 3.—The surface of the mud is very deeply eroded by watercourses, and these are frequently hard to distinguish from the fissures. These gullies are in a very active area on the northern slope of Trident Volcano.

The gases contain some of the strongest disintegrating agents known. Hydrofluoric acid and hydrochloric acid, together with superheated steam, proved to be the most common constituents of the outpouring gases, frequently issuing at a temperature above 400° C. Many fumaroles were so impregnated with these acids that it was impossible to breathe the vapours. The surface of the mud-flow surrounding some of the more acid vents was covered with ferrous chloride and impregnated with free hydrochloric acid. The presence of hydrofluoric acid in the emanations was accompanied by a deposit of amorphous silica around the vents, almost completely closing the orifices and forcing the gases to issue through cracks in the hot, baked silica. These deposits, sometimes 98 per cent. of pure silica and altogether anhydrous, formed dykes several feet high around the hotter vents.

This association of hydrofluoric acid and silica is not accidental. Hydrofluoric acid decomposes silicates, setting free the silicon as gaseous silicon tetrafluoride, and this in turn is decomposed in the presence of water, forming SiO_2 and free acid. The majority of the samples of encrustants brought back gave a qualitative test for fluorine, while quantitative results ran as high as 7 per cent.

Realgar and orpiment were found in conjunction with deposits of sulphur. Hæmatite in the form of "Venetian red" and small crystals of pyrites embedded in a matrix largely silica were common secondary reaction products of the volcanic gases. Hydrogen sulphide was almost ubiquitous.

Hygroscopic iron and aluminium salts formed in the throats of vents protected from the weather and at a temperature above 100° C. Unfortunately, these were highly deliquescent, and lost their crystalline form on exposure to the air.

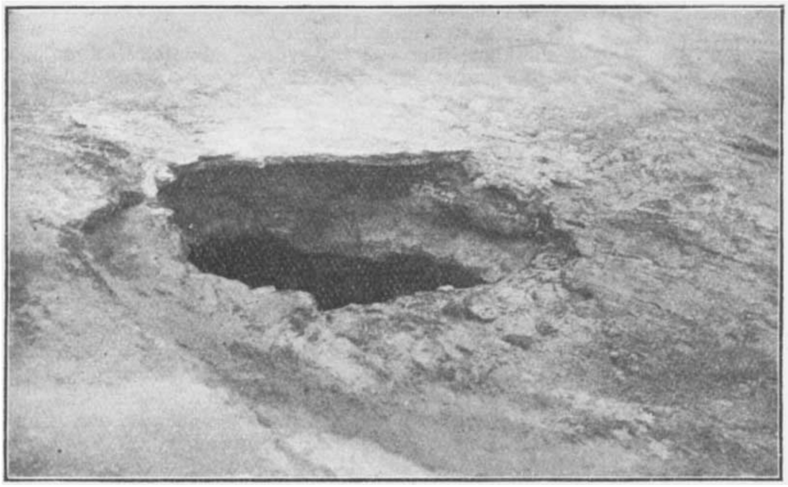
The throats of several vents near Novarupta were lined with quantities of ammonium chloride crystals, almost 99 per cent. pure.

One of the most interesting deposits was a tarry substance found in the proximity of the ammonium chloride fumaroles, which proved on analysis to contain hydrocarbons of an asphaltic character.

Many of the fumaroles contained ammonium compounds in the issuing gases, strikingly indicated by the growth of algæ. Wherever blue-green algæ were observed growing, there the issuing gases or encrustants contained ammonia; while, conversely, an active area not supporting algæ proved to have no trace of ammonia in its emanations or encrustants.

In connection with the presence of hydrofluoric acid, the deposits of sulphates, such as alum, are very significant. Potassium alum, appearing as lichen-like growths after every rainfall, covered the surface of the ash over many of the areas of activity. Sulphuric acid is a strong disintegrating agent, and its presence in the emanations gives a key to the formation of hydrofluoric and hydrochloric acids, for sulphuric acid acting on fluorides and chlorides sets free the more volatile halogen acids.

The volcanic ash and pumice which constitute the mud-flow have been highly altered by the passage of the volcanic gases. Analysis shows that in the vicinity of the vents the ash has lost a portion of its silica content, while the iron, calcium, and magnesium have been relatively concentrated. Sometimes the ash and pumice are completely disintegrated. Superheated steam containing halogen acids is a disintegrating agent that even rhyolite cannot withstand. The presence of so many large vents, tunnels, and channels in the mud-flow may well be attributed to the action of the volcanic gases.



Photo] [*J. W. Shipley.*

FIG. 4.—A typical volcanic vent. The gases were escaping from another hole some distance away along the horizontal tunnel. Note the thickness of the encrustants covering the tunnel. They consisted of silica, sulphur, fluorides, and compounds of iron.

The nature of the emanations, and the continuous evolution of heat and gases for seven years, with little indication of any diminution in volume, indicate direct magmatic origin for the phenomena of this valley. The extrusion of semi-fluid lava from Novarupta and in the bottom of the Katmai crater may signify a similar approach of the magma to the surface in the Valley of Ten Thousand Smokes.

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The Control of Scientific and Industrial Research.

ANNOUNCEMENT is made in NATURE of January 29 of the appointment of Mr. R. L. Frink to be director of research of the Glass Research Association, which has recently been formed as one of the Industrial Research Associations of the Department of Scientific and Industrial Research. The appointment raises a question which has intimate relations with scientific interests and progress, and it should not be permitted to pass without protest.

It has always been urged in the columns of NATURE, and accepted as a cardinal principle by men of science generally, that scientific research can only be rightly understood and sympathetically promoted by a director who has himself taken part in it. The essential qualification, therefore, of a director of research of each of the industrial research associations should be proved capacity for research; for without such aptitude the work undertaken is bound to be narrow, and the scientific aspects upon which progress ultimately depends to be neglected. This point of view, however, seems to have received secondary consideration only in the recent appointment; for what the secretary of the Glass Research Association says as to the qualifications of the director of research is: "Mr. Frink has a lifelong experience of the American glass trade and glass research, is well known to the foremost English glass manufacturers, and his appointment is welcomed by the British glass industry."

It is scarcely too much to say that this appointment has been received with intense astonishment by all scientific men connected with the glass industry, and by many glass manufacturers as well. In the glass industry, more, perhaps, than in any other, it was naturally expected that a director of research would be a man of distinguished eminence whose work was of proved scientific value; yet practically no such evidence is forthcoming in the case of Mr. Frink.

A scientific friend in America, who is recognised as one of the first authorities upon scientific matters connected with glass, tells me that Mr. Frink is not known as a research man or in research circles, but that he is highly spoken of by practical glass-makers "as a man of long experience in the window-glass trade who is accustomed to be called in as 'first aid' for furnace troubles, colour troubles, and like technical difficulties. This trade he has pursued for some years with success, and his reputation in this domain is among the best. He maintains a so-called laboratory and has a number of technical assistants, and, I fancy, has gathered together a considerable amount of rough-and-ready wisdom which has found extensive application in an industry where research laboratories have hardly been thought of until recently."

It seems quite possible that the Glass Research Association has secured the services of a very able, practical man, but in making the appointment the council of the association has negatived the policy elaborated with such care in the article published in NATURE of November 13 last: "The ideal director for this association is not an individual research worker whose glory is to work in splendid isolation; but is he who will bring *expert knowledge of the methods of scientific research* to bear upon these complex problems, who possesses such personality as to attract promising young research workers to his side . . . and to co-ordinate the efforts being made through the various laboratories, institutions, and works to which specific research and experimental work will be allotted." (Italics are mine.)

If the writer of that article, the temporary secretary of the association, had been a scientific man, he